INTERMOUNTAIN STATION
Central Reference File
No. 0.73

Research Note

NORTHERN ROCKY MOUNTAIN
FOREST AND RANGE EXPERIMENT STATION

Missoula, Montana

FOREST SERVICE
RECEIVED
AUG 21 1952
RESEARCH
INTERMOUNTAIN

No. 111

August 1952

NEW EQUIPMENT FOR THE 3-STEP METHOD

L. R. Short
Division of Range Research

The 3-step method of estimating trend in range condition developed by K. W. Parker and described in "A method for measuring trend in range condition on national forest ranges," Forest Service, U.S.D.A. mimeographed, utilizes a modified line-point transect (in step one) in which point or "micro"-plot observations along the transects are made by means of a 3/4-inch diameter loop mounted on a stiff wire handle. Placing and stretching the steel tape used to define the transect are greatly facilitated by portable equipment which includes a pair of tape holders or clamps capable of being attached to two portable stakes. Neither the loop nor the clamps and stakes are available from commercial supply sources. Herein described is simple, recently developed equipment designed to meet the requirements of the point transect which can be made up at minimum expense in any well equipped machine shop.

The tape-holding clamp shown is made from an ordinary iron pipe "T", size 3/8 x 3/8 x 1/4-inch, with the threads in the side, 1/4-inch opening converted to a 1/2-inch standard thread. A $1\frac{1}{4}$-inch bolt 1/2-inch in diameter is inserted in this opening. A piece of 7/8-inch soft bar steel, $1\frac{1}{4}$ inches in length, with a slot 5/8-inch wide, deep cut in one end to receive the tape, and a 1/4-inch hole bored from one side to the slot, is welded to the "T" opposite the 1/4-inch opening. A 1-inch bolt 1/4-inch in diameter, with nut affixed, is inserted in this hole, and the nut welded to the bar steel. Wings, made from 1/8 x 1/2-inch soft bar steel $1\frac{1}{2}$ or 1-3/4 inches in length are welded to the heads of the bolts to permit tightening without use of a wrench.

The suggested stake is of 1/2-inch steel rod, 28 inches in length and sharpened at one end to enter the soil. A footpiece of the same material is welded to the stake 10 inches from the point, extended laterally $4\frac{1}{2}$ inches, then turned at right angles to parallel the stake in the direction of its point for $3\frac{1}{4}$ inches. The distal end of the footpiece is sharpened. The stake is ground flat on one side above the footpiece, to better engage the setscrew of the tape-holding clamp and to prevent it from turning when tension is put on the tape. The footpiece facilitates setting the stake in the soil and prevents it from turning while in use.

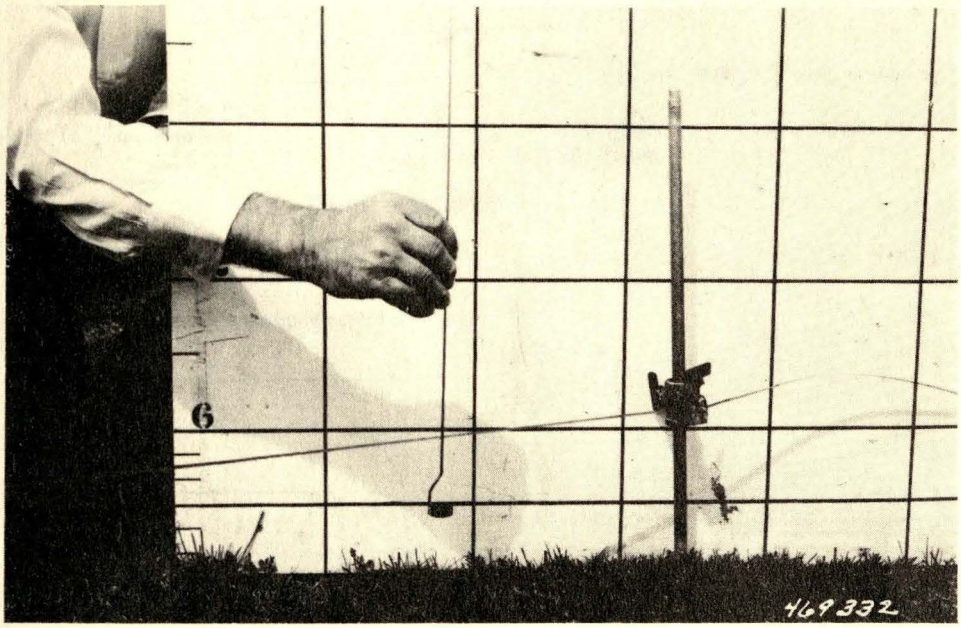

Figure 1. Stake with foot-brace and tape-holding clamp and loop with off-set handle.

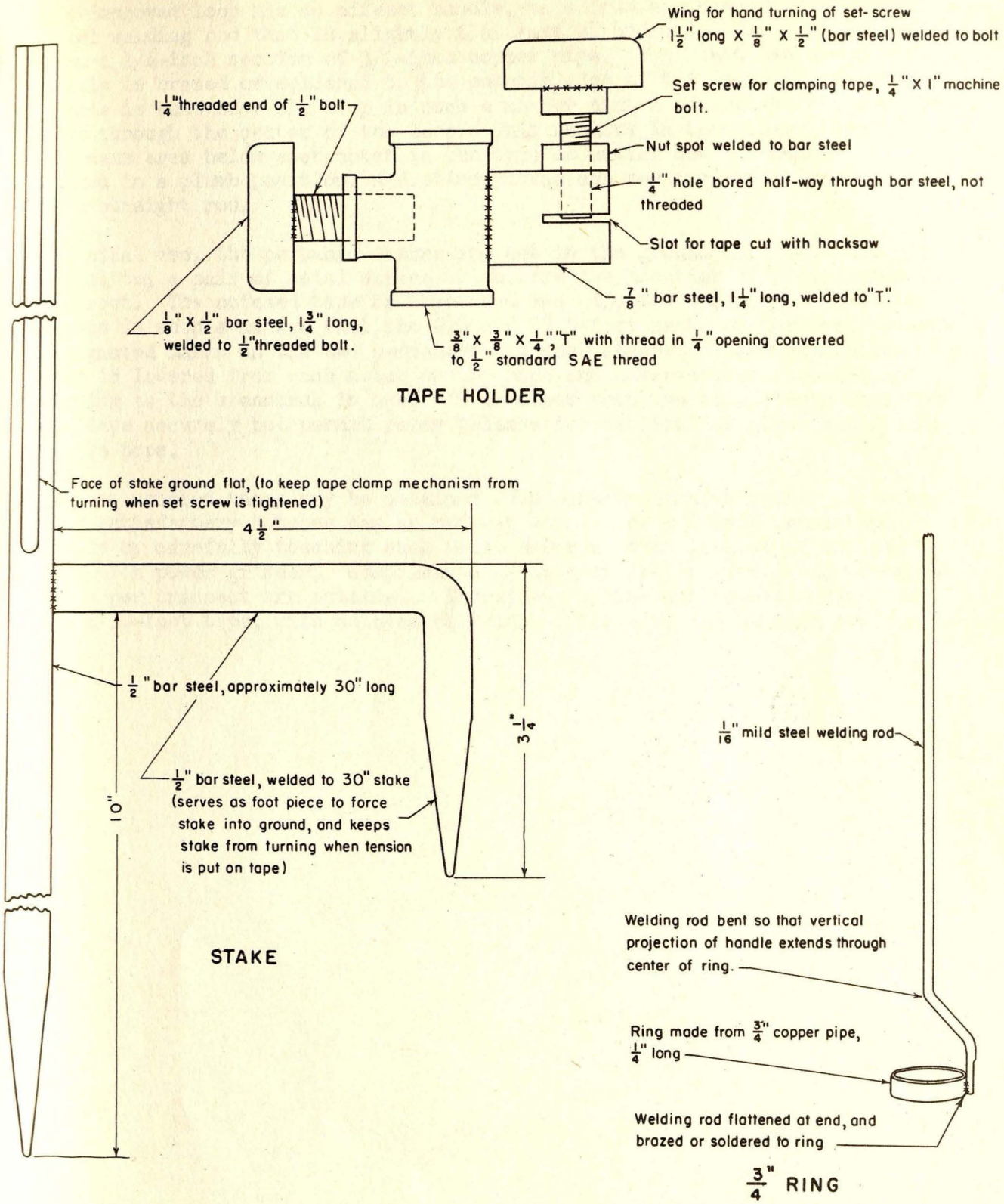
Wing for hand turning of set-screw
1½" long X ⅛" X ½" (bar steel) welded to bolt
Set screw for clamping tape, ¼" X 1" machine bolt.
1¼" threaded end of ½" bolt
Nut spot welded to bar steel
¼" hole bored half-way through bar steel, not threaded
Slot for tape cut with hacksaw
⅞" bar steel, 1¼" long, welded to "T"
⅛" X ½" bar steel, 1¾" long, welded to ½" threaded bolt.
⅜" X ⅜" X ¼" "T" with thread in ¼" opening converted to ½" standard SAE thread
TAPE HOLDER
Face of stake ground flat, (to keep tape clamp mechanism from turning when set screw is tightened)
4½"
½" bar steel, approximately 30" long
3¼"
10"
½" bar steel, welded to 30" stake (serves as foot piece to force stake into ground, and keeps stake from turning when tension is put on tape)
STAKE
1/16" mild steel welding rod
Welding rod bent so that vertical projection of handle extends through center of ring.
Ring made from ¾" copper pipe, ¼" long
Welding rod flattened at end, and brazed or soldered to ring
¾" RING

Figure 2. Specifications for the improved stake with foot-brace, tape-holding clamp, and loop with off-set handle.

The improved loop has an off-set handle, made from a piece of 1/16-inch soft steel welding rod that is slightly flattened at one end. The loop is made from a 1/4-inch section of 3/4-inch copper pipe. The flattened end of the handle is brazed or soldered to the outside edge of the loop, and then the handle is bent near the loop in such a manner that a linear extension would pass through the center of the loop. This results in the observation of the same area below each notch in the tape no matter how the handle is turned in a plumb position, a distinct advantage compared to a loop mounted on a straight rod.

In actual use, the portable stakes are set in the ground in line with, but distal to, a pair of metal stakes which mark the location of a permanent transect. The notched tape is stretched and adjusted between the portable stakes in such a manner that the 0.0 and 99.5-foot marks on the tape contact designated marks on the two permanent transect stakes. The wire-handled loop is lowered from each notch on the tape and observations recorded according to the standards in use. It is clear that the tape clamps must hold the tape securely but permit ready release for vertical or other adjustment of the tape.

Factory notched tapes may be obtained from certain manufacturers. However, very satisfactory notches can be made in any 1/4 or 3/8-inch metal tape simply by carefully touching each point where a notch is desired to the edge of a power grinder. Compilation of data is facilitated if 100 observations per transect are obtained. Therefore, a 100-foot tape is desirable, but a 50-foot tape, with notches at 6-inch intervals, can be used satisfactorily.